

issued to *Popelka et al.*, in view of US Patent 6,324,581, issued to *Xu et al.* Claims 5 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Popelka et al.*, in view of *Xu et al.* in further view of US Patent 6,356,929, issued to *Gall et al.* Furthermore, Claims 7 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Popelka et al.*, in view of *Xu et al.* in further view of US Patent 5,948,062, issued to *Tzelnic et al.* Finally, Claims 8-9 and 19-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Popelka et al.*, in view of *Xu et al.* in further view of US Patent 6,304,980, issued to *Beardsley et al.*

Overview or the Invention:

A network storage system includes a virtual file system (“VFS”) and a storage center. The VFS stores file system information to manage the files of the network storage system. The storage center stores the files of the network storage system. The VFS and the storage center are separated, such that a client accesses the VFS to conduct file system operations and the client accesses the storage center to upload/download files.

In one embodiment, the storage center includes a plurality of distributed object storage managers (DOSMs) and a storage cluster that includes a plurality of intelligent storage nodes. The DOSMs receive requests to access the storage center. The intelligent storage nodes store the files of the network storage system and service access requests from the DOSMs. The network storage system includes additional storage centers at geographically disparate locations. In one embodiment, the network storage system uses

a multi-cast protocol to maintain file information at the DOSMs regarding files stored in the intelligent storage nodes, including files stored in disparate storage centers. The storage center further includes a load balancing fabric. The load balancing fabric selects a DOSM for an access request based on demand to access the storage center. In addition, the DOSMs include a data cache for caching at least a subset of files stored in the intelligent storage nodes. The use of load balancing in the storage center results in caching data for files in high demand in the data caches of the DOSMs.

Overview of Popelka et al. & Xu et al.:

*Popelka et al.* disclose a file server with a host processor, network processors, and file storage processors. The network processor has one or more network interfaces and buffer memory for buffering requests from the network interfaces. The file server processors have one or more data storage devices for storing files and associated metadata about files.

*Xu et al.* disclose a plurality of data mover computers used to control access to a plurality of file systems. Each data mover computer receives client requests and accesses a single file system. If a client requests a file in a file system owned by another data mover computer, then the data mover computer, which received the client request, sends a request to the data mover that controls the respective file system. Then, the data mover computer, which received the request, places a lock on the file and returns metadata. The data mover computer, which received the client request, uses the metadata to formulate a

data access command. The command is sent over a bypass data path from the client request data mover to the other file system. (Abstract).

**The Claimed Invention Separates Control And Data In A Storage System With A Single File System That Stores Files Across Multiple Storage Nodes.**

Amended claim 1 recites, in part:

virtual file system (“VFS”) for storing file system information for a single file system to manage a plurality files of said network storage system, wherein a client of said network storage system accesses said VFS to conduct file system operations over a first channel, said client for receiving a unique file identifier from said VFS; and

storage center comprising:

a plurality of distributed object storage managers (DOSMs) for receiving requests, including said unique file identifier, to access said storage center; and

storage cluster, comprising a plurality of intelligent storage nodes, for storing files of a single file system across said intelligent storage nodes and for servicing access requests from said DOSMs;

wherein a client of said network storage system accesses said storage center and uses said file identifier to download files over a second channel, said second channel being different than said first channel.

Thus, amended claim 1 recites a system for conducting file system operations, in a single file system, over a first channel to a virtual file system. The client receives a unique file identifier from the VFS. The files of the single file system are stored across a plurality of intelligent storage nodes. The client accesses a file using the unique identifier. The file is downloaded over a second independent channel.

Applicants respectfully contend that the cited references do not disclose, either alone or in combination, separation of control and data in a storage system with a single file system that stores files across multiple storage nodes as claimed. As such, the cited references do render the amended claims unpatentable.

CONCLUSION

In view of the foregoing, it is submitted that the claims are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date.

Respectfully submitted,

STATTLER JOHANSEN & ADELI LLP

Dated: 5/20/03



---

John Stattler  
Reg. No. 36,285

Stattler, Johansen & Adeli LLP  
PO Box 51860  
Palo Alto, CA 94303-0728  
Phone: (650) 752-0990 ext.100  
Fax: (650) 752-0995



## The Amended Claims

The following pages provide the amended claims with the amendments marked with deleted material in [brackets] and new material underlined to show the changes made.

1. (Once Amended) A network storage system comprising:  
virtual file system ("VFS") for storing file system information for a single file system to manage a plurality files of said network storage system, wherein a client of said network storage system accesses said VFS to conduct file system operations over a first channel, said client for receiving a unique file identifier from said VFS; and  
storage center [for storing a plurality files of said network storage system,]  
comprising:  
a plurality of distributed object storage managers (DOSMs) for receiving requests, including said unique file identifier, to access said storage center; and  
storage cluster, comprising a plurality of intelligent storage nodes, for storing files of a single file system across said intelligent storage nodes and for servicing access requests from said DOSMs;

wherein a client of said network storage system accesses said storage center and uses said file identifier to download files over a second channel, said second channel being different than said first channel.

11. (Once Amended) A method for storing files in a network storage system, said method comprising the steps of:

storing file system information in a virtual file system "VFS" to manage a plurality of files of said network storage system;

storing a plurality files in one or more storage centers;

accessing said VFS to conduct file system operations over a first channel;

[and]

receiving, for a file, a file identifier from said VFS;

accessing said storage center using said file identifier to download said files of said network storage system over a second channel, said second channel being different than said first channel;

selecting one of a plurality of distributed object storage managers (DOSMs) to service said request;

storing files of a single file system across a plurality of intelligent storage nodes; and

accessing one of said intelligent storage nodes from said DOSM selected to service said request.